IN THE CLAIMS

What is claimed is:

1. A method of forming a plurality of semiconductor device layers, comprising the steps of:

forming an oxide layer by reacting hydrogen and oxygen on a surface of an insulating layer deposited over a wafer; and

forming a conductive gate layer over the oxide layer.

2. The method of claim 1, wherein:

the reacting of hydrogen and oxygen is performed at a wafer temperature in the range of about 800°C to 1300°C.

3. The method of claim 1, wherein:

the oxide layer has a thickness in the range of 20-60 angstroms.

4. The method of claim 1, wherein:

the reacting of hydrogen and oxygen on the wafer surface has a duration in the range of 30 seconds to 2 minutes.

5. The method of claim 4, wherein:

the reacting of hydrogen and oxygen on the wafer surface has a duration in the range of approximately 1 minute.

6. The method of claim 1, wherein:

the conductive gate material includes polysilicon.

7. The method of claim 1 wherein:

the oxide layer and conductive gate layer form a SONOS-type device.

8. The method of claim 1 wherein steps prior to forming the oxide layer comprise:

forming a tunnel dielectric; and

depositing the insulating layer, the insulating layer being a charge storing dielectric layer.

9. The method of claim 8 wherein:

the charge storing dielectric layer includes silicon nitride.

10. The method of claim 1, further including:

forming a gate etch mask; and

etching to form gate stacks; and

forming insulating sidewalls on the gate stacks.

11. The method of claim 8, wherein:

forming the tunnel dielectric, forming the charge storing dielectric layer, and forming the oxide layer occur in a single wafer processing tool.

12. A method, comprising the steps of:

forming a bottom dielectric on a substrate surface;

forming a middle dielectric over the bottom dielectric; and

forming a top dielectric over the middle dielectric by heating the substrate to less than about 1200 °C for less than two minutes.

13. The method of claim 12, wherein:

forming the top dielectric further includes reacting the surface of the middle dielectric layer with hydrogen and oxygen.

14. The method of claim 12 wherein:

the middle dielectric comprises at least one layer selected from the group consisting of silicon nitride, silicon oxynitride, and silicon rich silicon nitride.

15. The method of claim 12 wherein:

the bottom dielectric has a thickness of less than 15 angstroms; and

the top dielectric has a thickness of less than 50 angstroms.

16. A method of manufacturing a SONOS-type device, comprising the steps of:

oxidizing a charge storing dielectric comprising at least one layer that includes silicon and nitrogen by reacting hydrogen and oxygen to form a top oxide layer over the charge storing dielectric.

17. The method of claim 16, wherein:

the oxidizing lasts for less than two minutes.

18. The method of claim 16, wherein:

the oxidizing occurs at a temperature of less than 1200 °C.

19. The method of claim 16, further including:

a tunnel dielectric formed below the charge storing dielectric;

forming a conductive gate layer over the top oxide layer; and

patterning at least the top oxide and charge storing dielectric to form a gate stack.

20. The method of claim 16, wherein:

the top dielectric has a thickness greater than 20 angstroms.